This is a continuation application of Serial No. 09/319,779, filed June 11, 1999, which is a national stage application of PCT International Application No. PCT/JP97/04578 filed December 12, 1997.

Please replace the sub-heading beginning at page 1, lines 6-7, with the following rewritten sub-heading:

BACKGROUND OF THE INVENTION

1. Technical Field

Please replace the sub-heading beginning at page 1, line 16, with the following rewritten sub-heading:

2. Description of Related Art

Please replace the sub-heading beginning at page 9, line 7, with the following rewritten sub-heading:

SUMMARY OF THE INVENTION

Please replace the sub-heading beginning at page 22, line 16, with the following rewritten sub-heading:

DETAILED DESCRIPTION OF THE INVENTION

Please replace the paragraph beginning at page 24, line 9, with the following rewritten paragraph:

Fig. 2 is a block diagram showing the outline of a control section for executing mounting control of the component mounting apparatus. In Fig. 2, reference numerals denote respectively, 20 a storage section provided with a mounting program storage section 20a and a component data storage section 20b, 21 an input/output control section, 22 a component supply control section, 23 a recognition control section, 24 a positioning control section, 25 a pressure control section, 26 a height control section, and 300 a CPU. The mounting program storage section 20a stores: mounting data such as a mounting sequence, component names, mounting positions (X, Y, θ), and supply positions of components to be supplied; and a program for executing the mounting process. The component data storage section 20b stores information such as component names, component (appearance) shapes (widths, lengths, heights), colors, reference mark positions with respect to component body dimensions (appearance or external ends) or reference mark positions with respect to the centers of the components, patterns (arrangement positions) of the lands of BG connecting portions with respect to the reference marks, reference mark shapes (the center of gravity and positions of the vertex and the sides in the case of a triangular reference mark; the center of gravity and positions of the corners and the sides in the case of a rectangular reference mark; the center or the center of gravity in the case of a circle or dot reference mark), the ball shape (including sphere, sphere diameter, and so on) in each arrangement position, information of the presence or absence of a ball, and so on. The CPU 300 issues whole mounting commands and instructions to each of the driving units and so on. The input/output control section 21 is to execute input and output of the mounting program and the component data by manual input or by an FD or communications. It is otherwise acceptable to directly execute the input and the output of data of the actual X- and Y-positions, angle, pressure, and the like on the component supply control section 22, the positioning control section 24, the height control section 26, and the pressure control section 25, not by way of the input/output control section 21. The component supply control section 22 drives the component supply section of a tray, a cassette, or the like, and then supplies an

appropriate component to a component supply position. The recognition control section 23 executes the recognition of the component, reference marks of the component and the board, IC marks, arrangement patterns, and so on, executes comparison with the data stored in the component data and the mounting program, and calculates a difference between them. It is to be noted that this calculation may be executed by another control section, CPU, or the like. The positioning control section 24 controls the X-Y driving and θ-rotatory driving of the mounting head according to the above recognition information, while the pressure control section 25 controls the pressure in the mounting stage and component suction stage. The height control section 26 executes driving control of the mounting head in the Z-direction (the direction perpendicular to the X- and Y-directions). It is to be noted that the board conveyance is executed by a board conveyance control section 301.

Please replace the paragraph beginning at page 30, line 2, with the following rewritten paragraph:

On the lower surface of an IC chip 5b are preparatorily formed gold bumps 5d via aluminum electrodes 5c. This IC chip 5b is bonded with pressure via silver paste 5e on upper electrodes 5f of a single-layer or multi-layer carrier board 5a made of glass epoxy or ceramic and then encapsulated with resin to be formed into the complete BGA component 5. The BG connecting portions 6 are to be electrically connected to the upper electrodes 5f by wirings 5g that penetrate the carrier board 5a, and the reference marks 30 are formed simultaneously with each other on this carrier board 5a, as shown in Fig. 13A. Subsequently, the solder bumps 7 are formed. It is to be noted that the solder bumps 7 are not formed in the case of a bump-less component which needs no solder bump 7.

Please replace the paragraphs beginning at page 36, line 3 through line 16, with the following rewritten paragraphs:

In a board mounting position recognizing process, the target mounting position recognition marks 3D of the printed board 1 shown in Fig. 3A is confirmed and recognized by the board recognizing section 13b as needed (S6).

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In a determination (check) correcting process after the mounting position detection, the mounting position is corrected by securing a high degree of accuracy through the mounting position determination correcting process together with the foregoing component inspection results (S7).

Please replace the paragraph beginning at page 47, line 4, with the following rewritten paragraph:

Fig. 11A is a front view of a two-dimensional bar code provided on the surface opposite from the surface that has BG connecting portions of a BGA component according to a sixth embodiment of the present invention, while Fig. 11B is a side view of the above. The bar code is provided on the surface opposite from the connecting surface described in connection with the fifth embodiment. If the two-dimensional bar code 40 is provided on the upper surface of the BGA component 5 and a variety of information for mounting the components, such as the land pitch and positional information of the BG connecting portions of the various components are coded as the indicated information, then the mounting control of the mounting head height, the mounting speed, the mounting pressure control, and so on in the mounting stage can be executed for each component on the basis of the information as the checking and correcting processes in the component recognizing process (process S4) shown in Fig. 4. Furthermore, a two-dimensional bar code 40 having a larger size can be used by providing the bar code on the surface opposite from the

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connecting surface, and the information carrying area is enlarged to allow a wider variety of information to be provided. This operates favorably in controlling the mounting. If the amounts of deviation from the permissible range and the dropouts of the solder bumps are stored as information to be stored in the two-dimensional bar code 40 or another storage medium, then the information can be utilized as information for determining whether or not the component should be scrapped or reused with the solder bump reformed when the BGA component 5 is determined to be defective.

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Please replace the paragraph beginning at page 53, line , with the following rewritten paragraph:

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Furthermore, according to the present invention, the information of the coded reference mark(s) can assure an inexpensive and simple structure, without the necessity of providing a separate special device for executing detection, by virtue of the detection that is achieved and is also used for the recognition process.